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Description:

Textile grating

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The invention concerns a wide-mesh textile grating for reinforcement purposes in civil engineering, in particular for reinforcing ground layers, comprising weft thread groups and warp thread groups which are preferably connected together by weaving or knitting and which are each at a spacing of at least 8 mm with respect to the respectively adjacent parallel thread group and the individual threads of which are formed by high-strength yarns, wherein the warp thread groups and the weft thread groups of the textile grating are covered by a polymer coating.

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The invention also concerns a method of producing such a grating.

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Textile gratings of that kind are preferably produced by a weaving procedure. German patent No 20 00 937 discloses a weaving process for a textile grating of that kind, using a leno thread which is passed under a low level of tension in a zigzag configuration over the warp thread groups and which respectively extends at the sides of the warp thread groups under a weft thread group.

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The applicants market a fabric of that kind comprising high-strength polyester threads with a PVC-coating for reinforcing ground layers, under the name 'Fortrac'. A similar polyester fabric with a bitumen-bearing coating is marketed by the applicants for reinforcing asphalt layers in road construction under the trade mark 'HaTelit'. Polyester yarns but also PVA or aramide yarns ensure a long-lasting reinforcing action. Depending on the respective requirements involved however it is also possible to use other synthetic materials, for example polyolefins such as polyethylene or polypropylene, to form the high-strength yarns.

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It will be appreciated that, besides joining the warp thread groups to the weft thread groups by the described weaving procedure using leno threads, it is possible to use other connecting procedures. By way of

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example, thread groups which are in mutually superposed relationship and which are not interwoven can be fixed relative to each other by means of leno threads or other binding threads (for example by warp knitting) or by way of adhesive means. Adequate fixing of the finished grating can then  
 5 be achieved by means of the polymer coating.

The described reinforcing gratings have extensively proven themselves in civil engineering in the past. By virtue of the high-strength synthetic materials from which the yarns are formed and by virtue of the covering, they afford excellent resistance to rotting and weathering. Their  
 10 large meshes provide that, when the gratings are put into position, pieces of the ground or the respective reinforced layer penetrate through the meshes and in that way provide for interlocking engagement and a tight bond between the textile grating and the reinforced layer.

The polymer coating on the known textile gratings is relatively  
 15 dense, rigid and inflexible. The high weight by virtue of the high level of density and the rigidity of the grating can give rise to problems in terms of handling the grating during use thereof. The rigid coating means that deformation of the grating itself is possible only to a limited extent. The 'digging-in' engagement between the grating and the reinforced ground  
 20 layer therefore occurs solely by virtue of pieces of ground which project through the meshes of the grating. When the grating is being fitted in position or in the installed condition thereof, the rigid and relatively thin polymer coating can suffer from cracks or can partly chip off and flake away so that protection for the thread groups by the polymer coating can  
 25 be adversely affected.

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 The object of the invention is to provide a textile grating and a method for the production thereof, which substantially eliminates the disadvantages described hereinbefore.

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 30 That object is attained by a textile grating of the kind set forth in the opening part of this specification, which is characterised in that regularly distributed gas inclusions are contained in the polymer coating so that the polymer coating has a foam-like structure.

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As a direct consequence, the foam-like structure of the polymer coating affords a greater degree of flexibility for the coating as well as a lower level of specific density. The density of the textile grating is reduced in that way so that handling thereof is simplified. The coating also becomes generally softer so that the grating enjoys a higher degree of flexibility whereby handling is again simplified.

As the converse corollary foaming of the polymer coating means that the specific volume thereof is increased so that, even while involving a lower weight, it is possible to embody a greater layer thickness for the polymer coating. The polymer coating layer also enjoys a greater degree of elastic deformability by virtue of the foaming effect. The risk of mechanical damage to the polymer coating during installation is reduced by virtue of the greater thickness of the polymer coating layer and the reduced risk of the polymer coating chipping and flaking off because of the higher degree of elasticity.

Finally the individual thread groups which are covered by a foamed polymer coating enjoy a higher degree of flexibility and by virtue of the foam-like enclosure a compressibility so that digging-in engagement of the reinforced ground layer with the textile grating is effected not only by pieces of ground which project through the grating meshes but also by pieces of ground which produce local deformation and compression phenomena in respect of the individual thread groups.

Preferably, individual threads comprising multifilament yarns are adopted in the textile grating according to the invention, as in the state of the art. They are not only covered with the polymer coating but impregnated thereby. In that way each thread of the warp thread groups and the weft thread groups acquires a greater volume and attains compressibility in the procedure involving impregnation and encasing with the foamed polymer coating.

For a ground reinforcement grating, the coating can be formed from PVC (polyvinyl chloride) which is mixed with plasticisers and forms a pasty material which is capable of flow and which gels after immersion of the

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grating upon heating to a temperature of about 200°C. Alternatively, it is possible to use polyacrylic or polyurethane coatings which are applied in aqueous dispersions to the textile grating and which polymerise when the water is evaporated. It will be appreciated that it is also possible to use a bitumen-bearing coating which is applied hot.

The gas inclusions in the polymer coating should be as small as possible and preferably should not exceed a size of 0.3 mm.

In a method for producing the textile grating according to the invention, firstly high-strength warp threads and weft threads are connected together in particular by a weaving or knitting procedure in such a way that warp thread groups and weft thread groups which are respectively combined together are each at a spacing of at least 8 mm relative to the respectively adjacent parallel thread group. The thread groups are then wetted with a material which is capable of flow and which contains a polymer-forming substance. This wetting operation is generally effected by immersing the grating in a container with the material which is capable of flow. Alternatively, the material which is capable of flow can be sprayed on to the warp thread groups and the weft thread groups or applied in some other fashion. After the wetting operation the polymer is caused to set. The wetted grating is heated for that purpose, when using polymers which set hot.

The object of the invention is attained by adding to the material which is capable of flow a propellant which produces gas inclusions during setting of the polymer.

As already mentioned, the material capable of flow that can be used can be a pasty mixture of PVC and a plasticiser, which gels under the effect of heat. Alternatively, it is possible to use a polymer dispersion, for example a latex, polyacrylic or polyurethane dispersion, for wetting the grating, wherein the water of the dispersion evaporates under the effect of heat and polymerises the coating.

The propellant is to be selected in dependence on the polymer used and in dependence on the structure wanted for the foamed polymer.

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Different propellants for forming gas inclusions are known. For example, gases (for example nitrogen) or liquids which evaporate easily (hydrocarbons, chlorohydrocarbons, trichloroethylene or the like) are used as physical propellants for forming plastic foams. In particular chemical propellants which are suitable for forming the foamed coating according to the invention are those comprising solid materials which decompose at elevated temperature, liberating gases. Examples in that respect are azo compounds (for example azodicarbonamide), N-nitroso compounds and sulphonyl hydrazides which at temperatures between about 100°C and 270°C give off per gram between 100 and 300 ml of nitrogen. Additives, so-called 'kickers' which for example comprise metal compounds such as the Pb and Zn stabilisers in PVC-mixtures make it possible to adjust the temperature at which the gas is liberated.

The structure of the textile grating according to the invention is more clearly apparent from the accompanying drawings showing a preferred embodiment of the grating.

In the drawings:

Figure 1 is a plan view of a grating weave without polymer coating, producing in accordance with German patent No 20 00 937, and

Figure 2 is a plan view of the grating of Figure 1 with coating applied thereto.

The wide-mesh grating or lattice weave shown in Figure 1 has warp thread groups 1 and weft thread groups 2 which are each composed of twelve parallel threads 3 and 3' respectively comprising multifilament polyester yarn. The spacing of the warp thread groups 1 from each other and the spacing of the weft thread groups 2 from each other is about 40 mm. Each warp thread group 1 is accompanied by a leno thread 4 which is passed in a zigzag configuration over the warp thread group 1 and which extends at the respective sides of the warp thread group 1 under a weft thread group 2.

After the weaving procedure the grating weave produced in that way is immersed over its entire width in a bath with a material which is

capable of flow and which contains a polymer-forming substance. In that case, as can be seen from Figure 2, a closed polymer coating 5 is applied around the warp thread groups 1 and the weft thread groups 2 and connects those respective thread groups 1 and 2 to form a respective closed strand. The polymer coating is only of a small thickness (on average less than 1 mm). The gas bubbles enclosed therein are substantially invisible with the naked eye and are of a diameter of less than 0.3 mm. Non-homogeneities in the distribution of the propellant or blowing agent can however also give rise to the existence of locally larger gas bubbles.

Preferably, when the textile grating or lattice is immersed in the material which is capable of flow, all threads of a thread group 1, 2 are connected together and the individual threads 3, 3' are impregnated. Depending on the respective purpose of use involved however, it may also be desirable for the individual threads 3, 3' to be encased only at their outside or not to provide for complete homogenous connection of the individual threads of the yarn groups to each other.

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